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# EDITORIAL

**On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful. The editor, alone, is responsible for their type, their tone and their tenor.**

## THE VOICE OF PHARMACY?

"IN union there is strength"—Yes, providing that the strength is applied or exercised! An organization may well boast of its size and its growth but unless the forces of such a group be truly dedicated to worthy and practical purposes its very existence is to be deplored.

On the other hand it is relatively easy for any one, and particularly one unfamiliar with the inside work of an organization, to criticize its failure to achieve certain results.

There is a good fortune, tuned to time, which allows results in organization projects to come and to come easily, yet which at another period might never have been realized.

And there are many other factors, involving policies and personalities which govern the success of organized efforts.

The divisions of pharmacy are such that its conduct seems to need a multiplicity of organized groups, each dedicated to its special field. The commercial phases of pharmacy are well represented, and from the retailing to the manufacturing and wholesaling divisions every group seems to be covered. The same thing is equally true of the professional and scientific branches of the calling.

*Yet there is no voice speaking for pharmacy as a whole,* as there is for medicine, as there is for nursing, and as there is for most of the other professions.

. . . . .

And today, more than ever, such a voice is needed, needed because state medicine, socialized medicine, medicine by government, is definitely on the march.

Government, municipal, state and federal, seems to be convinced that the health of the citizen is *its* concern. Strangely enough, this premise is fostered for better or for worse, by the zealous and superzealous health officials themselves, despite a certain opposition from organized medicine.

One can clearly see the responsibility of a government toward protecting the health of the well, by corralling and curing the contagiously unwell.

One can clearly see the obligations of a government toward safeguarding the health of the truly indigent. One can clearly see the right of a government to insist that its citizens undertake proven preventive treatment against such infectious dangers as smallpox.

No one denies the value of the health insurance plan, nor the group hospital service idea.

But there is now a definite trend to bring more than the indigent and the contagious or contagious-to-be into a controlled health picture.

The new definition of democracy is a very indefinite one, and the so-called inalienable rights of the citizen are being given a brand new interpretation. This is particularly true in the field of public health.

Sensing this condition and this definite trend, is there a voice in pharmacy, is there a leadership in pharmacy that will conserve for the public and for the profession, the kind of service which pharmacy can give and is entitled to give?

If there is, now is the time to get ready.

IVOR GRIFFITH.

# ORIGINAL ARTICLES

## THE EFFECTIVENESS OF CERTAIN DRYING AGENTS ON THE MOISTURE CONTENT OF DIGITALIS

Donald P. LeGalley*

ABOUT two years ago the Chairman of the Revision Committee of the U. S. Pharmacopœia, Dr. E. Fullerton Cook, suggested that we undertake a series of experiments whose purpose was to test accurately the effectiveness of various drying agents on deliquescent drugs. This was done with the object of getting experimental information about the action of these drying agents under actual working conditions, with the hope that the information might prove helpful in the packaging of drugs.

The scientific literature carries a great deal of information about the moisture absorbing qualities of certain drying agents, secured from experiments in which moisture ladened air is passed over the drying agents, or from other dynamic experiments (1, 2, 3, 4, 5). However, there is very little information about drying agents used under static conditions, or under conditions in which the amount of water available to be absorbed is very small such as would be the case of digitalis or ergot stored for pharmaceutical use. Although experimental data was collected only on the effectiveness of the desiccants on digitalis, the results would be equally true of any corresponding deliquescent drug.

Since in actual practice digitalis is stored in glass containers, in metal containers, and in cardboard containers, it was thought desirable to design the experiments to imitate actual storing conditions. With this in mind a total of nineteen experiments were performed, the essential results of which are to be reported on in this paper.

### Results

Many scientists are amazed when confronted by actual physical measurements showing the moisture absorbing ability of digitalis.

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Those working in this field have probably often noticed that when weighing out samples of digitalis on a chemical balance, it is practically impossible to find the rest point on a day when the relative humidity is high.

In order to see how much moisture digitalis would absorb under extreme conditions a series of experiments was run in which porcelain dishes were filled with digitalis and placed in a desiccator in which there was a 100 per cent. relative humidity atmosphere. The number of grams of water absorbed per gram of digitalis was determined as it varied with time. The results of one of the typical determinations is shown in Figure 1. It is interesting to note that in this case 100 grams of digitalis would have absorbed 34 grams of moisture in one week. It will be noted that the absorption rate is very rapid during the first few hours, but that as the experiment continued the rate of absorption slowed down. This indicates the importance of storing dry digitalis in airtight containers, and shows why any container which is opened and closed often should contain a drying agent of some kind.

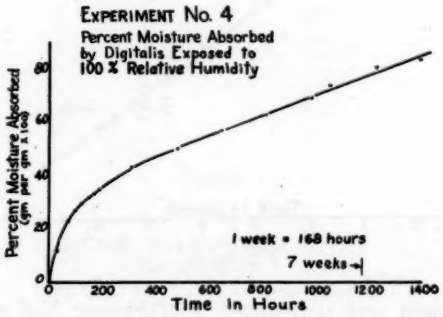


Figure 1.

It might be mentioned that this experiment was performed by weighing the porcelain evaporating dish on an analytical balance, then weighing the dish and sample, and then weighing the two plus the water absorbed over the times indicated. . . . From this data the moisture content can be accurately computed at any time. This method was checked against the Toluene method and found to agree with it satisfactorily.

An experiment might be described here in which a sample of digitalis with a moisture content of 5.84 per cent. was placed in a

cardboard container, similar to those used by some companies to ship and store digitalis. The container was allowed to stand on a shelf in the ordinary room atmosphere and at room temperature. The moisture content of the digitalis was measured each week for a period of nine weeks. The first week the moisture content increased to 9.38 per cent., the second week to 11.32 per cent., the third week to 14.37 per cent., and so on. The moisture content rose or fell dependent on the relative humidity during the week. These results show that a cardboard container is a very unsatisfactory way of storing digitalis.

Most of the remaining experiments deal, not with getting the moisture into the drug, but in getting it out.

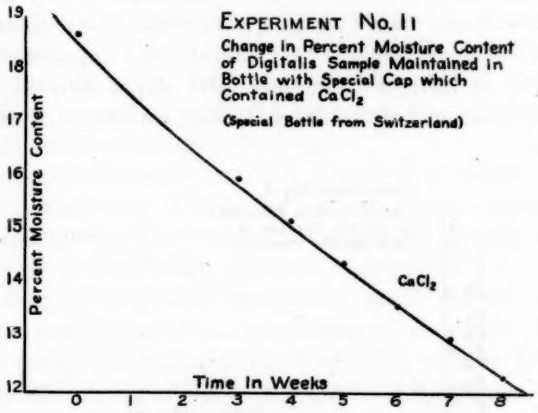


Figure 2.

An experiment was performed, Experiment No. 11, to test the rate at which water would be removed from a sample of digitalis containing 18.6 per cent. water by placing Calcium Chloride in the top of the bottle containing the digitalis. The Calcium Chloride was placed in a glass container and suspended from the top of the bottle by an arrangement whereby the moisture laden air was free to circulate between the digitalis and the Calcium Chloride. The experiment was performed in a special bottle secured from a pharmacy in Switzerland by Dr. Cook, and the results are shown in Figure 2. It will be noticed that the moisture content is reduced quite satisfactorily from 18.6 per cent. to 12.3 per cent. in a period of eight weeks. These would be extreme conditions, but we were anxious to learn what this

arrangement, and what this drying agent, would do under extreme conditions.

Following this another experiment was performed in which three bottles of digitalis similar to the one described above were used. In one Calcium Chloride was the drying agent, in another Lime, and in the third Drierite (6). The results are shown in tabular form in Figure 3 and a graph of these results is shown in Figure 4. The

REDUCTION IN MOISTURE CONTENT OF DIGITALIS IN BOTTLES

Drying Agents Placed in Cap of Special Bottle From Switzerland

| Weeks | $CaCl_2$ | CaO | Drierite |
|---|---|---|---|
| Start | 7.3% | 6.7% | 6.15% |
| 1 | 6.8 | 6.3 | 5.80 |
| 2 | 6.4 | 6.2 | 5.55 |
| 3 | 6.1 | 6.0 | 5.32 |
| 4 | 6.0 | 5.7 | 5.18 |
| 5 | 5.9 | 5.6 | 5.06 |
| 6 | 5.9 | 5.6 | 5.11 |
| 7 | 5.9 | 5.5 | 5.18 |
| 8 | 5.8 | 5.35 | 5.22 |
| 9 | 5.8 | 5.2 | 5.28 |
| 10 | — | 5.0 | 5.32 |

Figure 3.

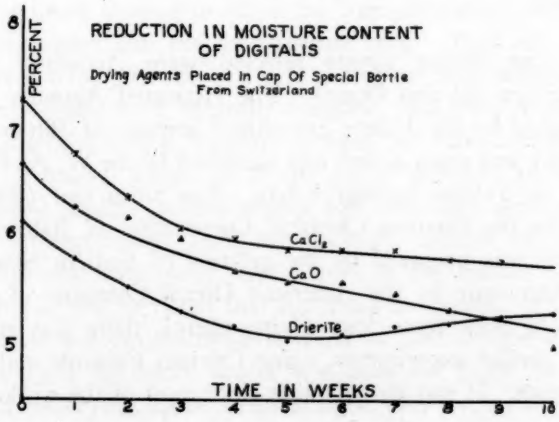


Figure 4.

moisture content in each case was below that specified by the U. S. Pharmacopœia, namely 8 per cent., and it will be noticed that in each case the drying agent not only reduced the moisture content, but was also able to maintain it at this lower level. The only possible exception is the case of the Drierite. In this case, although the results were quite satisfactory from a drying agent point of view, it will be noticed that after a period of five weeks a point of saturation was reached beyond which the Drierite was not able to reduce the moisture content further. In each case conditions similar to those encountered in actual pharmacy practice were imitated, namely that the bottle was opened and closed frequently to make the moisture content determinations. This would allow moisture present in the atmosphere to enter the bottle when it is open—just as would be the case in a pharmacy.

After trying the effectiveness of these three drying agents it was deemed advisable to make a complete study of other drying agents, in an effort to find several which could be recommended for the packaging of drugs. After a careful study of the scientific literature four drying agents were selected on the basis of the following considerations:

1. Moisture absorbing ability.
2. Non-toxic effect.
3. Reactivation ability.
4. Cost.

The four drying agents selected were Activated Alumina, Drierite, Silica Gel and Doucil. The Activated Alumina ($Al_2O_3$) was furnished by the Fisher Scientific Company of Pittsburgh, Pa. The Drierite was mesh 4, and was furnished by the W. A. Hammond Company of Yellow Springs, Ohio. The Silica Gel ($SiO_2$) was prepared by the Davison Chemical Corporation of Baltimore, Md. The Doucil was prepared by the gelation of Sodium Silicate with Sodium Aluminate by the American Doucil Company of Philadelphia. Along with these four drying agents, there was run simultaneously similar experiments, using Calcium Chloride and Lime as drying agents. It was thought that since most of the workers in the

field are familiar with the results secured with Calcium Chloride and Lime that it might be interesting to run them as controls for the four mentioned above.

Twelve bottles were equipped with special lucite holders screwed to the inside of the lid, and suspended inside the bottle as shown in Figure 5. In the holders was placed the drying agent being studied, while the bottle was filled about two-thirds full of digitalis. Eight holes each three-sixteenths inch in diameter were drilled around the

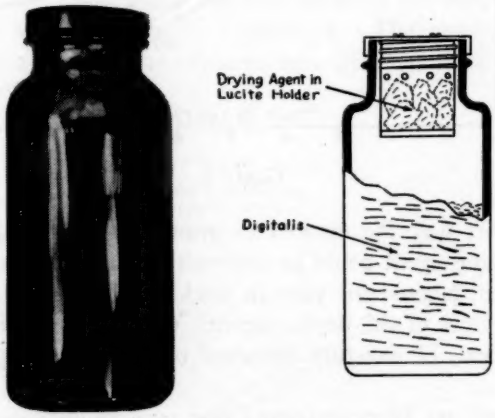


Figure 5.

top of the lucite holders to allow the free circulation of air between the drying agent and the deliquescent drug. Two sets of experiments were tried. In the first set, known as experiments 15-A and 15-B, the bottles were carefully weighed, and filled with a known mass of digitalis, whose moisture content had been accurately determined. A known weight of drying agent was then placed in each of the lucite holders, whose weight had also been accurately determined. In experiment 15-A the moisture content of the digitalis was determined each week, and a plot of the results is shown in Figure 6. It will be noted that the moisture content of the digitalis in each case was satisfactorily reduced as time progressed. In experiment 15-B the lucite holder was removed from the bottle cap and with its drying agent weighed accurately on an analytical bal-

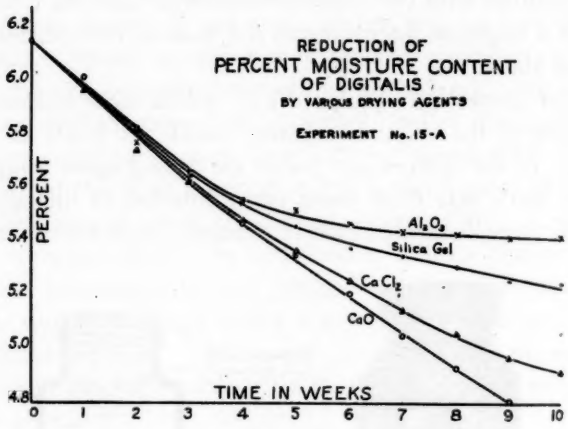


Figure 6.

ance. In this way the number of grams of moisture absorbed per gram of drying agent could be determined, and is plotted in Figure 7 as per cent. against the time in weeks. The results show that in the case of most of the drying agents, that there is a continual rise in the per cent. of moisture absorbed by the drying agents as time progresses.

A second set of experiments was run simultaneously with the first set. In the second set experiment 16 was performed by placing

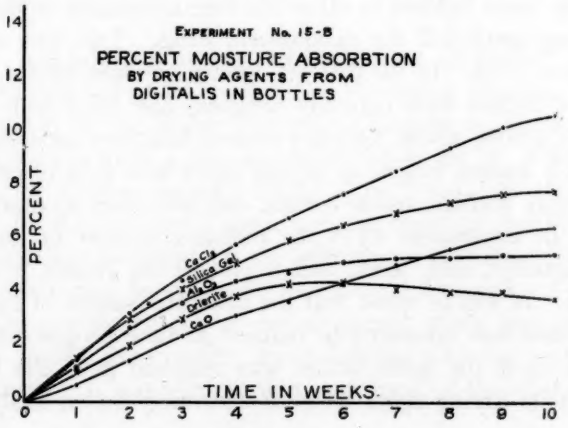


Figure 7.

the same drying agents in lucite holders identical with those used in experiments 15-A and 15-B, and then placing the lucite holders in a desiccator with water in the bottom. This provided a 100 per cent. relative humidity atmosphere, and allowed the drying agents to absorb all of the moisture that they were capable of absorbing. The lucite holders and their drying agents were weighed on an analytical balance at 5 P. M. each day for a period of twenty days. By knowing the mass of the drying agent, and the mass of the moisture absorbed it was possible to calculate the grams of moisture absorbed per gram of drying agent. Throughout the determination the temperature was held constant at 71 degrees ± 1 degree F. The results for all the drying agents are plotted as per cent. against time, and are shown in Figure 8.

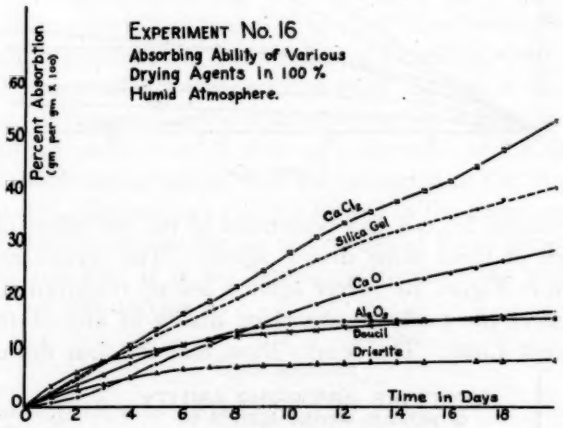


Figure 8.

At the end of twenty days the drying agents were removed from the lucite holders, placed in an evaporating dish, and dried in an oven electrically controlled at a temperature of 130 degrees C. for a period of seventy-two hours. After the drying agents had been reactivated they were placed back in the lucite holders, and these in turn were placed back in the desiccator with the 100 per cent. relative humidity atmosphere. Experiment No. 17 was performed by determining the amount of water which the drying agents had absorbed per gram every four days for a period of twenty days. The

results are plotted and shown as Figure 9. The only marked difference between Figure 8 and Figure 9 is that in Figure 9 the Lime has dropped down to the lower rate of activity after the reactivation, as would be expected. Apparently the other drying agents are not greatly affected by the reactivation.

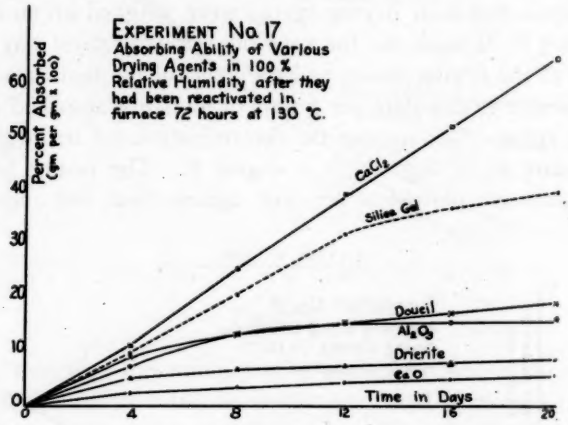


Figure 9.

Experiment No. 18 was performed to test the effect of another reactivation of these same drying agents. The results are plotted and shown in Figure 10. Here again a second reactivation does not seem to effect the moisture absorbing ability of any of the drying agents except Lime. The results show that the four drying agents

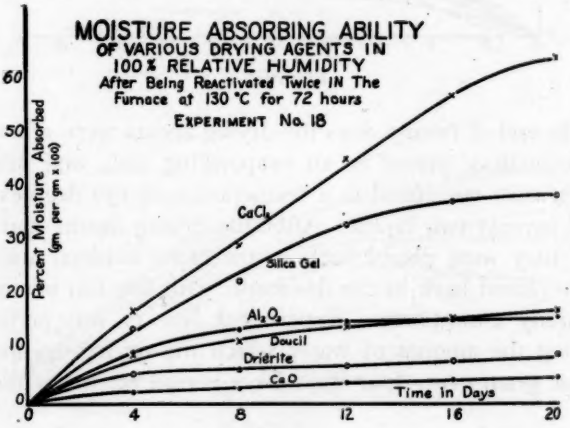


Figure 10.

selected can be used over and over again without losing their water absorbing abilities.

When these results were first presented at the U. S. Pharmacopœia Convention the suggestion was made that the reactivation of these drying agents might be made at a higher temperature, possibly 175 degrees C. or 200 degrees C. An experiment was therefore run in which each of the drying agents used above was reactivated at 130 degrees C. for the seventy-two hours as performed in the above experiments. Then these same drying agents were subjected to a temperature of 175 degrees C. for twelve hours, and again weighed on the analytical balance, and the loss of weight (presumably due to moisture) determined. In the case of Doucil this was about 1 per cent. while in all the rest it was not over .2 per cent. Following this, the same drying agents were subjected to a temperature of 200 degrees C. for a period of twelve hours, and then reweighed and the loss of weight determined. In the case of Doucil this additional loss was slightly more than 1 per cent. but in all the rest it was less than .3 per cent., indicating that the reactivation at 130 degrees for seventy-two hours had removed more than 99.5 per cent. of the moisture in the case of each drying agent, with the exception of the Doucil. This means that the reactivation process followed in the above experiments was a satisfactory one as far as the results of these experiments is concerned, and that it is not necessary to reactivate them at 175 degrees C. or 200 degrees C.

## Conclusions

These experiments show:

1. That the moisture absorbing ability of digitalis in a 100 per cent. relative humidity atmosphere is larger than many workers realize. It has been determined and is shown in Figure 1.

2. That the moisture content of deliquescent drugs can not only be maintained, but that they can also be reduced when drying agents are suspended in the bottle containing the drug.

3. That of the four desiccants used in these experiments the order of desirability from the moisture absorbing ability point of view is as follows:

First—Silica Gel.
Second—Activated Alumina.
Third—Doucil.
Fourth—Drierite.

It might be pointed out that all four of the drying agents acted very satisfactorily, and that any one of them might be used advantageously as a drying agent, but that these experiments showed Silica Gel to be the best of the group.

4. That all four of the drying agents selected for these tests worked quite satisfactorily after being reactivated, and therefore could be used time and again as drying agents. The only thing which is required for their reactivation is to place them in an oven which is at a high enough temperature to drive off the moisture present.

5. As a result of these experiments it can be recommended that some good drying agent or drying agents (preferably one or ones which can be reactivated) should be suspended in the container containing the deliquescent drug, whenever this drug is packaged or stored.

6. That Calcium Chloride and Lime would be ruled out as drying agents to be suspended in the top of bottles containing drugs for quite obvious reasons. The Calcium Chloride collects a liquid brine when it is exposed to moist air, while the Lime cannot be reactivated, and in addition it would be dangerous if spilled into the drug being dried.

I wish to thank Dr. E. Fullerton Cook, Chairman of the Revision Committee of the U. S. Pharmacopœia for his interest, counsel and advice throughout this group of experiments. Also it should be mentioned that the funds for the materials of these experiments were furnished by the U. S. Pharmacopœia, as well as the major part of the funds for carrying out the work.

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# GLYCYRRHIZA PREPARATIONS OF THE U. S. P.*

Percy A. Houseman†

BEFORE considering the preparations of glycyrrhiza, I should like to say a few words about licorice root itself as described in the U. S. P. The unground Spanish licorice root is described as tasting "sweetish and slightly acrid"; the Russian simply as "sweetish." This seems unfair to the Spanish root which is actually less acrid than Russian. Therefore the Russian root should also be described as slightly acrid. Perhaps "bitter" is a better word for this purpose than "acrid," since "acrid" often connotes a pungency and a burning or irritating sensation in the nose or throat such as is caused by the fumes of burning fat. All licorice root is slightly bitter rather than acrid, and is better described as sweet than "sweetish."

I am not competent to pass upon the botanical descriptions given for licorice root, but they appear to have been taken from a very early source, and may deserve revision in the light of the latest edition of Tschirch's "Handbuch der Pharmakognosie."

Passing now to the two preparations Extract of Glycyrrhiza and the so-called *Pure* Extract of Glycyrrhiza, we have here a curious and rather unfortunate use of the word "Pure." Surely with the Pure Extract immediately following the Extract, the emphasis on *"Pure"* for the one casts a distinct innuendo if not a definite accusation of *"Impure"* on the other.

The only difference is one of quality. Both are pure, just as two cabbages are pure, though one may be of a better quality than the other. Nowhere else in the Pharmacopœia does this peculiar and apparently unwarranted use of the word "pure" appear, and I would suggest its deletion in favor of the word "percolated."

With regard to the commercial Extract of Glycyrrhiza, this is described in U. S. P. XI as brittle and having a conchoidal fracture. Brittleness in licorice extract is obviously dependent on moisture content and on temperature. The description therefore requires clarification, particularly in terms of moisture content.

* Read at the U. S. P. Pre-Convention Scientific Conference, Washington, D. C.

† MacAndrews & Forbes, Camden, N. J.

Under "Tests for Purity" it is directed that not less than 60 per cent. is soluble in cold water. I do not know whether this minimum of 60 per cent. soluble includes the water present in the extract, but I presume it does, since water is naturally soluble in water. In any case the balance of 40 per cent. is too much insoluble matter to be permissible, and in place of prescribing 60 per cent. *soluble* it would be better to allow not over 25 per cent. *insoluble* in cold water. A new test stating the amount insoluble in boiling water is desirable in order to detect inorganic loading agents or excessive dirt. The matter insoluble in boiling water should not exceed 5 per cent.

Finally in the matter of ash in the commercial Extract of Glycyrrhiza, the Pharmacopœia says "does not exceed 8 per cent." This is a reasonable maximum figure, but it is perhaps more important to include a minimum ash figure of 4 per cent., since adulteration, if practiced, is more likely to be with such materials as starch or sugars, which are very *low* in ash. Figures for ash have little meaning as a check on purity, since a high ash due to *mineral* adulteration could easily be lowered to a normal figure by still further adulteration with sugar or boiled starch.

I have embodied these proposed changes in a new description attached.

EXTRACTUM GLYCYRRHIZAE

*Extract of Glycyrrhiza*

Ext. Glycyrrh.—Extract of Licorice Root, Licorice

A pure commercial Extract of Glycyrrhiza prepared from the rhizome and roots of species Glycyrrhiza (Fam. Leguminosae) and having a characteristic and sweet taste which is slightly acid and also slightly bitter.

*Description and physical properties.*—Extract of Glycyrrhiza occurs as a brown powder, or in blocks having a glossy black color. When the moisture content of the blocks is below 20 per cent. they have a brittle conchoidal fracture. At higher moisture content the blocks have a tough texture at 20 degrees C.

*Tests for purity.*—Not more than 25 per cent. of Extract of Glycyrrhiza should be insoluble in water at 25 degrees C.; not more than 5 per cent. should be insoluble in boiling water; and the amount of ash should be not less than 4 per cent. and not more than 8 per cent. All of these figures are on the basis of dry extract.

Prepare a 5 per cent. aqueous solution of Extract of Glycyrrhiza in cold distilled water. On mounting a sample of the sediment and examining it under the microscope *foreign* starch must not be present.

Turning now to the Pure Extract of Glycyrrhiza, which I have already suggested should be called Percolated Extract of Glycyrrhiza, the description of the method of preparation is rather vague. The root is percolated to exhaustion. The percolate, of unknown volume, is evaporated to one-half of that unknown volume, and then filtered. We have no idea what strength the partially evaporated liquor might have, but experience has shown that it is very difficult to filter licorice liquor of *any* strength unless a diatomaceous earth is mixed with the liquor before filtering. Decanting after long settling would be an acceptable alternative, providing care is taken to prevent decomposition.

It further seems desirable to make the method of preparation for Pure Extract of Glycyrrhiza conform to that for Fluidextract of Glycyrrhiza up to the point where alcohol is added for the Fluidextract.

To this end it is proposed that ammonia be added to the aqueous percolate for the Pure Extract as is now required for the Fluidextract. I will now present my proposed new description for Pure Extract of Glycyrrhiza.

### Extractum Glycyrrhiza Percolatum

*Percolated Extract of Glycyrrhiza*

Ext. Glycyrrh. Perc.—Perc. Extract of Licorice Root

Moisten 1000 gm. of glycyrrhiza, in coarse powder, with boiling distilled water, transfer to a percolator, and percolate with boiling distilled water until the glycyrrhiza is exhausted. Add enough ammonia water to the aqueous percolate to impart a distinctly ammoniacal odor, then boil the liquid under normal atmospheric pressure or in vacuo until it is reduced to a volume of about 2500 cc. Filter, preferably with the aid of siliceous earth, and evaporate the filtrate until the residue has a soft plastic consistence. The resulting extract should contain 25 per cent. to 27 per cent. moisture and the yield should be about 375 grams.

*Description and physical properties.*—A dark brown plastic mass having a characteristic and very sweet taste.

For the Fluidextract, the current Pharmacopœia does not specify the content of licorice extract. Since the yield of aqueous extract from licorice root varies considerably, it follows that the licorice strength of Fluidextract of Glycyrrhiza is a very uncertain quantity.

I recommend weighing out a definite quantity of the Pure Extract of Glycyrrhiza, namely 375 grams, which represents a fair average yield of extract from root, dissolving this in water to the specified volume of 750 cc. and then adding alcohol as directed.

The filtration should be done on the finished Fluidextract rather than on the aqueous solution because filtration is much easier *after* the alcohol is added, and also because the alcohol causes a slight additional precipitation in the aqueous solution.

My proposed new description for Fluidextract of Glycyrrhiza is as follows:

FLUIDEXTRACTUM GLYCYRRHIZAE

*Fluidextract of Glycyrrhiza*

Fldext. Glycyrrh.—Fluidextract of Licorice Root

Prepare Pure Extract of Glycyrrhiza as described on page 426, and dissolve 375 grams of this product in hot distilled water to a volume of 750 cc. Cool, and add 250 cc. of alcohol with stirring, and enough distilled water to make the product measure 1000 cc. Mix thoroughly. Allow to stand for about an hour and filter.

*Alcohol content.*—From 20 to 24 per cent., by volume, of $C_2H_5OH$.

*Preparations.*—Elixir Glycyrrhiza, Mistura Opii et Glycyrrhizae Composita.

Average dose.—Metric, 2 cc.—Apothecaries, 30 minims.

# NEWS ITEMS

## Philadelphia College of Pharmacy and Science Announces Undergraduate Scholarship Awards

ANNOUNCEMENT of undergraduate awards for scholastic excellence during the past year was made at an assembly of the students of the Philadelphia College of Pharmacy and Science on Tuesday, November 12. Dr. Wilmer Krusen revealed the action of the faculty in making public the annual honor list of the College.

Heading the group with the highest record of the entire Senior Class for the 1939-40 session was Samuel Lesitsky, of 2100 Wanamaker Street, Philadelphia, who will receive the Thomas S. Wiegand Scholarship. This award is given each year in honor of the late Librarian of the College who exercised considerable influence on educational activities for the latter decades of the nineteenth century.

Second honor in the pharmacy section of the graduating class was given to Milton Perloff, of 1201 Pine Street, Philadelphia, who will receive the Peter Williamson Award, carrying the name of one of the men who founded the institution in 1821.

The top ranking student in the chemistry division of the Senior Class is William Sieber, of 833 Knorr Street, Philadelphia, who receives the Thomas H. Powers Scholarship, given in memory of one of Philadelphia's early industrialists in the chemical field.

The James Shinn Award for ranking excellency in scholastic work, offered to members of the third year undergraduate group, was awarded to Eric Martin, of Vancouver, British Columbia. The Edward Jones Scholarship, won by Martin Yanishevsky, of 5829 Pine Street, Philadelphia, is given annually to the Junior student in the pharmacy division who reached second ranking on the basis of study achievement of the previous year.

James Hetrick, of 3159 Gaul Street, Philadelphia, received the Henry and William P. Troth Award for leadership in the chemistry division of the institution. This scholarship is awarded annually to a member of the Junior Class.

Only a few tenths of one point separated the averages for study achievements during the recent first year in the professional careers of Herman Milner, of 420 Catherine Street, and Daniel Kacher, of

6135 Delancey Street, both of Philadelphia. Milner made the higher grade and received the Pennsylvania Alumni Scholarship, established by the members of the Pennsylvania Branch of the College Alumni Association. The Maisch Scholarship for second honors was awarded to Kacher. Both students are in the pharmacy department. High honors for second year students in the bacteriology department was awarded to Miss Rose Peterson, of 15 North Buffalo Avenue, Atlantic City, New Jersey. This was the noted Robert Bridges Scholarship, awarded annually in honor of that early pioneer in scientific research and education in Philadelphia.

The special William L. Cliffe Memorial Scholarship, established in memory of the late renowned pharmacist of this city, was given to Grafton Chase. This award is based upon achievement in general chemistry studies, made by the students during the preceding year. Chase lives at 401 Park Avenue, Collingswood, New Jersey.

The special E. T. Dobbins Scholarship, awarded on the basis of a competitive examination to which first year pharmacy students, residents of New Jersey only are eligible, was awarded to Peter Bogarosh, of 318 Warren Street, Phillipsburg, N. J. The Dobbins award is named after that well known late resident of New Jersey.

## RESEARCH IN THE FIELD OF PHARMACOPŒIAL REVISION

DURING the Pharmacopœial Convention last May, a request was presented for the publication from time to time of research problems, which, if solved, would assist in the work of revision. To comply with this request the chairmen of sub-committees have been requested to suggest subjects which in their special fields were particularly important.

The following subjects have been offered:

1. A method for biological assay of Ergot that measures the content of both Ergotoxine and Ergonovine types of alkaloids.

2. An efficient and inexpensive method for biological assay of Aconite and its preparations.

3. Statistical studies of the value of Anti-pneumococcic Serums in general practice.

4. A suitable standard of assay for Rheum based upon its Anthraquinone content.

5. The comparative anatomy of the rhizomes and roots of Chinese Rhubarbs yielded by *Rheum officinale, R. palmatum, R. palmatum* var. *tanguticum* and hybrids between these and other Rheum species including *R. Rhaponticum.*

6. Further studies of the assays of Cantharides, Ipecac and Capsicum.

7. Chemical assay of Aconite and Aloe.

8. The separation of Strychnine and Brucine.

9. The therapeutic value of reduced iron.

10. The absorption of pure powdered electrolytic iron from the alimentary tract.

11. Rapid, accurate method for the determination of the pH of distilled water.

12. Further study of the limit of unsaturates test in Cyclopropane.

13. Heavy metals' test for Diluted Hypophosphorous Acid.

14. The sensitivity of the flame test for sodium in chemicals used as reagents.

Note: In the case of some reagents, e. g. potassium oxalate is required to "impart no distinct yellow color to a colorless flame," while in the case of potassium nitrite a yellow flame is given by the

presence of about 0.05 per cent. sodium when testing a 5 per cent. solution, and with potassium nitrate a yellow flame indicates about 0.02 per cent. sodium when a 10 per cent. solution is tested. Careful tests on sodium free salts to which known quantities of sodium salts are added would make possible a revision of the statements and might result in corrections.

15. Oil of Cassia, tests and constants.

16. Oil of Nutmeg, detection of Pinene or redistilled Oil of Turpentine.

17. Oil of Peppermint, tests and constants (distinction between unrectified and rectified).

18. Stability of Fluidextract of Ergot.

19. Tincture of Digitalis. A study of the U. S. P. Tincture and a comparison of the tincture made from defatted drug to determine the difference, if any, in activity.

20. A cytogenetical study of Rheum officinale, Rheum palmatum and other Asiatic Rhubarbs.

21. A cytogenetical study of Digitalis purpurea.

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## The Layman Scientist in Philadelphia

Technological advances, medical discoveries and science for national defense occupy the citizen's mind. But there is another phase of science and its relation to the public not so widely recognized. That thousands of non-professionals occupy their leisure in scientific pursuits is unknown to many people.

A study of Philadelphia, supported by a grant from the Carnegie Corporation of New York and under the supervision of the American Philosophical Society, reveals some startling facts. Results of this survey now for the first time brought together in "The Layman Scientist in Philadelphia" (a 44-page illustrated booklet), show that this sample metropolitan community contains 287 active amateur organizations. The more than 32,000 persons represented in these laymen's groups have access to 72 different museums, institutes, libraries, observatories and other science resources. There are over 120 courses in 19 fields of science open to the adult public.

Copies of the booklet may be obtained for 10 cents each or 15 cents by mail by addressing W. Stephen Thomas, Executive Secretary, Committee on Education and Participation in Science, The American Philosophical Society, 104 South Fifth Street, Philadelphia, Pennsylvania.

# ABSTRACTS FROM AND REVIEWS OF THE LITERATURE OF THE SCIENCES SUPPORTING PUBLIC HEALTH

**Medical Bacteriology in Army Hospitals: Progress Since 1918.** L. Thompson, *Proc. Staff Meetings, Mayo Clinic 15,* 705-707 (1940). If someone asks "What's new in bacteriology?" the reply often is that things are running along about as usual. But if we should think back to 1918 and compare the procedure in army hospitals with what we might expect to be the procedure today, we would find marked changes. New methods give more reliable results in much less time. A few examples follow:

The typing of pneumococci can now be done by the capsule-swelling test of Neufeld in thirty minutes compared to the old method of mouse inoculation which required at least six hours and more often twelve or twenty-four hours. With the advent of sulfapyridine therapy there is growing evidence that it may be unnecessary to determine the exact type of pneumococcus present in cases of pneumonia. The information that a pneumococcus is present may be of value in choosing the most effective therapeutic agent.

The culture methods for Neisseria, using carbon dioxide as a stimulant to growth, have given vastly superior results over previous methods. The culture method for Neisseria gonorrhea is especially efficient in detecting small numbers of organisms, which are often missed by the smear method of examination. In cases beyond the acute stage, or following treatment, twice as many positive results may be obtained by culture as by smear. This is especially true in the examination of prostatic secretion, in which the smear method of diagnosis has been difficult and uncertain. The carbon dioxide method of culture is also useful in getting rapid results with Neisseria intracellularis (meningococcus). An incubation period of fifteen to eighteen hours is sufficient. Given adequate incubator space, a rapid survey for carriers within institutions or barracks could be made. The growth of the meningococcus is so rapid and profuse by this method of culture that single colonies of bacteria can be picked from plates streaked with secretion from the nasopharynx and used to make suspensions for slide agglutinations. Thus, the whole process of culture and confirmation by agglutination test could be completed within eighteen hours.

The sulfite-ferric chloride medium of Wilson and Blair, for detecting Clostridium welchii, offers a quick and accurate method as compared to the "stormy fermentation" test in milk which was used earlier. Six to eight hours usually are sufficient with the newer medium.

Another time-saving factor is the available supply of dehydrated culture mediums, which need only the addition of water and sterilization before use. Such mediums are offered by several supply houses in sufficient variety to satisfy practically all needs of the bacteriologist. This is most important because often, in army hospitals which are operating on a temporary basis, to make adequate and standardized mediums is difficult.

Several new mediums have been proposed for the purpose of isolating typhoid and dysentery bacilli. These mediums are designed to be at least partially selective. The fact that such mediums are constantly appearing, plus the fact that the investigators recommend the simultaneous use of several mediums, seem to indicate that no one of them can be considered entirely satisfactory, but the ultimate result is that, by a combination of methods and mediums, the total of positive results is increased.

It is since 1918 that undulant fever and tularemia have been recognized, and the bacteriologic laboratory has been called on to aid in diagnosis, largely through the agglutination test. The finding of the specific organism by culture of blood or from lesions is conclusive, but this may fail, particularly after the first four weeks of illness. Agglutinins of high titer are usually of significance. Those below 1-160 should be interpreted with caution. It should be remembered that there often is some cross agglutination reaction between the organisms causing undulant fever and tularemia.

For the purpose of anaerobic culture, new mediums and more recent apparatus are available. Worthy of mention is the thioglycollate medium described by Brewer in 1939, and the simple apparatus devised by Spray for making anaerobic plates. The study of anaerobic bacteria in gas gangrene is important for army hospitals.

Nearly all of the items mentioned, along with others which might be given, are factors in the development of greater speed or accuracy in bacteriologic diagnosis. Yet they do not lessen the volume or variety of work which should be attempted. Rather do they increase the scope and usefulness of medical bacteriology in army hospitals and emphasize the importance of properly trained

personnel in order to make adequate use of the methods which are available.

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**Irrigation With Hot Sulfanilamide Solution.** F. R. Adams. *Medical Times 68,* 499 (1940). Good results have been reported by the author in the use of hot sulfanilamide solution in the irrigation of dental abscesses. The method of treatment involves three commonly used methods of destroying organisms as follows: mechanical, chemical and thermal. It is possible to make a hot solution containing 6 per cent. of sulfanilamide in solution and to deposit sulfanilamide on every surface of the infected area.

The number of bacteria and the quantity of pus present, if any, are considerably reduced by irrigation. The above two factors are important in sulfanilamide therapy.

The effect of moderate or slight increases of temperature has not always been recognized in disinfection. Water alone at 60 degrees C. destroys in vitro many bacteria found in periapical infections. The bactericidal power of sulfanilamide is increased by a slight elevation of temperature; for example: at 40 degrees C. it becomes bactericidal instead of bacteriostatic. At 37 degrees C. approximately 100 times as much sulfanilamide was required to sterilize as at 39 degrees C. (White, J. Bact. *38,* 549 (1939)).

The action of sulfanilamide is accelerated in gonorrhea by the production of artificial fever. Dr. Adams believes that the definite rise in temperature of the urethra after a few days explains the reason for the better effect of sulfanilamide when administered several days later than when started at the beginning of the attack.

Sulfanilamide dissolves in hot water up to 6 per cent. at 60 degrees C. Such a solution may be injected into a root canal and out through the fistula without harm to the tissues. The 60 degrees C. solution cools to body temperature when injected and precipitates approximately 5½ per cent. of the drug as crystals in every part of the infection.

When sulfanilamide is administered orally to obtain local effects, it is frequently necessary to saturate the whole system, causing dangerous toxic symptoms. Dentists have used sulfanilamide extensively in local applications in preventing and destroying infections in tooth extractions but the medical practitioner has not as yet employed it to any extent.

Local implantation of sulfanilamide in secondary infection in compound fractures has been found efficient. A 0.5 per cent. solution of sulfanilamide employed to irrigate in gonorrheal conjunctivitis reduces the number of days, in which a negative smear is obtained, from 27.2 to 6.8 days.

In streptococcal cases of postnasal catarrh a sulfanilamide paint or spray should be used. The dental divisions in many New York hospitals use sulfanilamide locally in treating osteomyelitis of the jaws.

Only one case of chronic infected periapical areas out of many treated required nine treatments whereas all others gave negative cultures after one application.

Streptococci have been found in root canals and lesions, but no particular type has been isolated. In addition, staphylococci, pneumococci and various rods are often present. Two negative cultures must be obtained before the canals are filled. Rapid regeneration of the bone can be observed by roentgenographic examination.

It is not always necessary to remove the teeth. Frequently, extraction of the tooth does not remove all the infection. By proper treatment all the infection can be removed from the periapical area and the canal, and the sterile root canal filled without any further difficulty.

It is suggested that the above method of treatment, as presented, may stimulate further interest in the local use of hot concentrated solutions of sulfanilamide in other conditions (with changes depending upon tissues to be treated). M. O. H.

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**Heparin and Its Applications.** J. M. Janes. *Univ. West. Ontario M. J. 10,* 65 (1940), through *Squibb Abstr. Bull. 13,* 1505 (1940). The history, properties, experimental and clinical use of Heparin are reviewed. Attention to this substance was first called by McLean in 1916. It was prepared from dog liver and found to prevent coagulation. Charles and Scott at the Connaught Laboratories in 1933 were able to secure heparin in pure form on a commercial basis and in 1936 isolated the active substance as a crystalline Ba salt. Murray, through experimental and clinical work, has made it an agent of proven therapeutic value.

It is believed at present that the ability of heparin to prevent clotting is due to the reaction of heparin with a material in plasma and serum to form antithrombin. Heparin can be extracted from

all the vascular tissues and for commercial purposes it is at present obtained from the lungs of cattle. It is very similar in chemical structure to chrondroitin sulfuric acid. The empirical formula may be written $C_{25}H_{65}O_{50}N_2S_5$. The S appears to be present as $-SO_3H$. Heparin is the strongest naturally occurring organic acid known and forms salts readily with basic proteins such as the protamines.

It is effective in preventing clotting but will not dissolve a clot already formed. It is useful in blood transfusion (used in vitro or given to the donor) and in blood analyses. Its chief clinical use is after embolectomy to prevent recurrences or after other types of vascular surgery to prevent the formation of thrombi. Heparin is also being used, in combination with chemotherapy, in the treatment of subacute bacterial endocarditis. Use of such a combination has been suggested for osteomyelitis since the lesions of this disease are thought to have an infective thrombotic basis.

The chief disadvantage of heparin is its cost. The next step in the research on heparin should be its synthesis. L. F. T.

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**Preparation and Uses of Blood Plasma.** M. Strumia. Philadelphia Hospital Pharmacists Association. November meeting. The speaker stated that the following conditions justifiably require transfusions: (1) infections; (2) hypoproteinemia; (3) hemorrhage; (4) liver disease; (5) shock with or without hemorrhage; (6) burns. The specific and non-specific immune bodies in plasma complement make plasma valuable in infections. The plasma protein aids in increasing the plasma protein in shock and burns.

Transfusion with whole blood is justifiable in only one emergency condition, that of poisoning where the hemoglobin can no longer carry oxygen.

No satisfactory substitute for human plasma is available at present. Beef blood plasma has been used but the patient may be hypersensitive—and if not at the time, sensitization generally occurs after the one administration.

Glucose and saline temporarily relieve shock symptoms but more severe symptoms frequently follow. Acacia is of no value in shock. Due to the high protein content of plasma, plasma remains for a time in the circulation. In shock, collapse is often due to an insufficiency of blood, inadequate to maintain the pressure necessary to send the

blood to the organs. Increased permeability of blood vessels in shock from cold allows the plasma to escape and collapse occurs. Rapid replacement of lost plasma restores a normal condition.

The plasma is prepared from human blood. The latter is collected in a bottle suitable for centrifuging to permit use of a closed system. An anticoagulant such as sodium citrate or heparin is added. The former is preferred, as heparin is more expensive and less certain of action when injected into the body. The blood is then allowed to settle, the erythrocytes slowly settling to the bottom. A very thin wavy middle layer consists of leucocytes and a top opalescent layer forms of plasma and platelets. The most rapid method of precipitating the red cells is by the hematocrit which eliminates 40 to 48 per cent. of the red cells. The blood should be kept at 8 degrees C. until centrifugalized. A specially constructed centrifuge allows forty-five minutes of centrifugalization with no more than 10 degrees rise in temperature. A two hour removal from the refrigerator is not harmful. By centrifugalization the average yield of plasma is 54.4 per cent. The plasma is drawn off, pooled and preserved by freezing and maintaining that state at 10-15-25 degrees below 0 degrees C. or dehydration. Freezing the plasma makes it difficult to transport. It must be thawed gradually making it too slow for emergencies. It is a quick, cheap and easy method. Dehydration involves special apparatus which freezes the plasma and evaporates the moisture under high vacuum. Complete drying requires forty-eight to seventy-two hours but when dried the product remains stable indefinitely as long as it is kept from moisture. Addition of an amount of pyrogen-free, sterile, distilled water equivalent to the original volume restores dried plasma to the original state. One dose of plasma is considered as 500 cc.

Shockproof containers are now being perfected for transportation and war-time use.

No typing of blood is necessary in using plasma.

Rapid recovery occurred in a severe case of postoperative shock when 500 cc. of plasma was administered immediately upon onset of the condition. Maintenance of life for two weeks with blood plasma is necessary before skin grafting may be done. The first eleven to twelve days are the worst. In shock cases it may be necessary to administer two to three pints of plasma but burn cases generally require more. M. O. H.

**Carbohydrate Values of Fruits and Vegetables.** H. R. Bierman, W. H. Olmsted, L. Wicks, R. D. Williams. *Journal of Nutrition 19,* 593 (1940). The authors present copper-iodometric reactions and biological procedures (pancreatic digestion and yeast fermentation) for more accurate analysis of foods. Previously the calculations of total carbohydrates have been based upon the difference between 100 per cent. and the sum of results obtained in the direct determination of protein, fats, moisture, ash and fiber. The "difference method" is considered inaccurate. A new classification of fruits and vegetables according to their carbohydrate content is presented:

| 3% (2.1-4.0) | 1% (0.3-2.0) | 5% (4.1-6.0) |
|---|---|---|
| Asparagus | Beans, snap (young) | Beans, snap (medium) |
| Broccoli | Brussel sprouts | Blackberry |
| Cauliflower | Cabbage | Carrot |
| Celery | Cranberry | Currant |
| Cucumber | Egg plant | Muskmelon |
| Greens | Gooseberry | Pumpkin |
| Dandelion | Lemon juice | Strawberry |
| Kale | Radish | Squash, winter |
| Mustard | Tomato | Watermelon |
| Endive | Turnip | |
| Spinach | | |
| Lettuce | | |
| Rhubarb | | |
| Squash, summer | | |

| 7% (6.1-8.0) | 9% (8.1-10.0) | 11% (10.1-12.0) |
|---|---|---|
| Beet, red | Apricots | Apple |
| Grapefruit | Blueberry | Cherry |
| Onion | Orange | Corn, sweet (young) |
| Raspberry | Orange juice | Fig |
| Rutabaga | Peach | Grape |
| | Pear | Nectarine |
| | Plum | Parsnips |
| | | Pea |
| | | Pineapple |

The vegetables in the first two groups may be prescribed without concern over the carbohydrate content. M. O. H.

**Ointments.** S. D. Littlewood. *Pharm. J. 145,* 85 (1940). A mixture of stearyl and cetyl alcohols with the phosphated esters known commercially as Lanette Wax is recommended for ointment manufacture. At ordinary temperatures it is a white hard solid melting at a comparatively low temperature. It is miscible with oils, waxes and fats and forms stable neutral emulsions with aqueous media of the O/W type. When it is remembered that the skin secretions are usually very slightly acid and that previously all O/W types of emulsions were alkaline due to the almost invariable use of soaps in their preparation, these neutral emulsions become increasingly interesting and useful.

A basic ointment that may be used in general practice or whenever aqueous material is to be incorporated is as follows:

| | |
|---|---|
| Lanette Wax S. X. | 2 parts |
| Liquid Petrolatum | 3 parts |
| White Petrolatum | 3 parts |

The ingredients are simply melted together, mixed and allowed to cool.

A mixture of equal parts of this basic ointment and cod liver oil is recommended as superior to cod liver oil itself in the treatment of burns, scalds, x-ray and radium burns and chronic ulcers.

Ointments containing cholesterol have been in use for many years under the name of Eucerin. If 5 to 6 per cent. of cholesterol is incorporated into white petrolatum an ointment base is obtained that can be used in place of the Basic Ointment above.

The following formula is given for a neutral cold cream of the non-borax type.

| | | |
|---|---|---|
| Basic Ointment | 25. | gm. |
| Cholesterol | 0.25 | gm. |
| White Petrolatum | 15. | gm. |
| Nipagin-m | 0.25 | gm. |
| Nipasol-m | 0.05 | gm. |
| Glycerin | 10. | gm. |
| Perfume | q. s. | |
| Water | to 100. | gm. |

L. F. T.

# BOOK REVIEWS

**Done by persons, unafraid to upbraid, but perfectly willing to give praise where praise is really due.**

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**Sulphated Oils and Allied Products.** By Donald Burton, M. B. E., D. Sc., F. I. C., and George F. Robertshaw, A. M. S. T., A. I. C., with foreword by Prof. T. P. Hilditch, D. Sc., F. I. C. Chemical Publishing Company, Inc., 148 Lafayette Street, New York, N. Y. 1940. 163 pp. Price: $5.00.

Although Turkey Red oil and similar sulfonated oils have been used extensively in the textile trades for many years, the use of sulfated and sulfonated oils, fats, alcohols and hydrocarbons has been rapidly extended to other industrial fields and uses during the past decade. The manufacturing chemist and control analyst has not had available for ready reference a single source book of information and was limited to the standard works in oil and fat chemistry and to the current literature.

The authors have filled a definite need in this respect in the current volume. The subject matter is divided into six chapters: Historical Survey, Raw Materials and Methods of Sulphation, The Chemistry of Sulfation, The Analysis of Sulfated Oils, The Analysis of Sulfated Fatty Alcohols, The Analysis of Petroleum Sulfonic Acids. The material is well documented. The reviewer believes some improvement in the durability of the book, from the standpoint of the control analyst, can be achieved by making future printings on a coated paper stock since it is his experience that the kind of paper used by the publisher will not stand the "gaff" in the laboratory.

The reviewer feels that the book should be a part of the "working library" of every analytical laboratory and would also be very useful to the manufacturing pharmacist, and makers of cosmetics, polishes, detergents and other chemical specialties. Needless to say in the textile field the book will enable the textile chemist to make a satisfactory evaluation of the various new "wetting agents."

Finally, in the words of Professor Hilditch we can say that the book should be "of definite service in promoting the further research which is clearly required before the chemical control of many of these products can be regarded as worthy of their industrial importance."

G. W. PERKINS.

**Rubber Latex.** By Henry P. Stevens, M. A., Ph. D., and W. H. Stevens, A. R. C. Sc., F. I. C. First American Edition. The Chemical Publishing Company, 148 Lafayette Street, New York, N. Y. 224 pp., 17 figs. Price: $2.00.

The first American edition of this book is reproduced from the fourth British edition. There are numerous literative citations but these do not cover any since 1935. To the rubber chemist the extensive patent abstracts are more than worth the price of the book. These abstracts cover a period from January, 1920, to April, 1935, and include nearly 900 abstracts of British patents pertaining to rubber especially with reference to latex.

Approximately one-half of the book is composed of these patent abstracts. The book includes information on the sources, production, general properties, manipulation, stabilization, vulcanization, applications and marketing of latex. It is not written as a treatise but rather for the purpose of giving general information. The analytical determinations cover less than four pages. Although the book is said to be an "American" edition, no attempt has been made to edit the book to conform to American terminology. On page 11 the reader must bear in mind that the English gallon is larger than an American gallon. On page 12 the abbreviation "grms" which is the British for "Gms" (grams) might be mistaken for grains. On page 17, "Aluminium" has been spelled in this country without the second "i" for nearly two decades. On page 24, "half a crown a pound" might be stated in terms of American dollars.

To the reviewer the greatest value of the book is due to the abstracts of patents which are never obsolete.

As for the remainder of the volume, it would have been well to have brought the descriptive matter up to date and not ignore the five-year interval between the last British edition and this American reprint.

G. W. PERKINS.